Seminar Paper No. 722

INTRA-GENERATIONAL CONFLICT: THE ROLE OF BALANCED BUDGET RULES

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July 2003
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July 7, 2003

Abstract

A balanced budget requirement affects the intra-generational wealth distribution and reduces the socially preferred level of government spending. These effects can explain why some groups support balanced budget rules while other groups in the same generation oppose them. Simulations suggest that the intra-generational distributive conflicts surrounding balanced budget rules are prevalent. Survey data suggests that they are empirically relevant. Intra-generational conflict offers a coherent explanation for the observed partial support for balanced budget rules.

1 Introduction

After a brief spell of (projected) surpluses, the U.S. federal budget is deep in the red again. In the European Union, several member states are about to repeatedly violate self-imposed caps on their budget deficits. For Japan, the OECD predicts a budget shortfall of more than seven percent of GDP. Reflecting these developments, recent years have seen an increased interest in institutional constraints on fiscal policy makers. Balanced budget (BB) requirements have attracted particular attention. The theoretical interest in BB rules has been accompanied in several countries by growing political support for them. In the U.S., where weak forms of BB rules are implemented in most states[1], a similar requirement has repeatedly been suggested for the federal government. In Europe, the "close to balance" imperative in the European Union's "Stability and Growth Pact" aims in a similar direction. While heralded by some observers as welcome measures against irresponsible fiscal policy makers, other groups have voiced sharp opposition against BB rules.

In this paper, I propose two explanations for the observed partial support for BB rules. Both explanations emphasize the presence of distributive conflicts between members of the *same* generation. These conflicts are either due to different growth rates in the tax base across individuals or different preferences with respect to the level of government spending. More specifically, the former conflict arises because the timing of tax collections does not only affect deadweight burdens but also the distribution of tax burdens across groups: A change in financial

*106 91 Stockholm, Sweden. E-mail: dirk.niepelt@iies.su.se. Helpful comments from Daron Acemoglu, Olivier Blanchard, Ricardo Caballero, and Torsten Persson as well as editorial assistance by Christina Lönnblad are gratefully acknowledged. ver82.tex

[1]Cf. Poterba (1994) or Bohn and Inman (1996).

policy shifts the relative tax burdens between individuals if their tax bases grow at different rates. The second conflict arises since households trade off the costs and benefits of government spending differently.

The introduction of a BB rule "resolves" the first distributive conflict by fixing the timing of tax collections. This prohibits direct redistribution through the shifting of tax burdens across groups and indirect redistribution through the general equilibrium effects on factor prices.[2] With respect to the second distributive conflict, the effects of a BB rule are more subtle. To the extent that the deadweight burden minimizing tax profile for a given level of government expenditure involves budget deficits and surpluses, a BB requirement increases the cost of financing government spending. Conversely, fiscal policy makers spend less under a BB rule than otherwise. Constituencies with relatively weak preferences for government spending might therefore support a BB requirement. This effect of a BB rule on the subsequent optimization problem of policy makers is related to a channel highlighted by Persson and Svensson (1989). They analyze how a budget deficit or surplus by one government influences the spending decision of the subsequent one. Persson and Svensson show that a "conservative" government might run a deficit in order to induce a subsequent "liberal" government (favoring higher government expenditure) to spend less. In my model, the subsequent government cannot be constrained by the debt level inherited from its predecessor, but only through the fiscal constitution under which it operates—which creates the appeal of a BB requirement.

Section 2 makes the basic points. In a simple framework, it discusses the circumstances under which a household supports a BB requirement. Section 3 extends the analysis to a general equilibrium framework. Quantitative examples clarify the mechanisms. Section 4 discusses empirical evidence, alternative explanations for the support of BB rules, and concludes.

2 Political Conflict and Balanced Budget Rules

Consider a small open economy that exists for two periods, $t = 0, 1$. The gross rate of interest is exogenously given, at β^{-1}, where β is the time discount factor of households and the government. Two groups of households, a- and b-types with fractions η and $1-\eta$, respectively, derive logarithmic utility from consumption, c_t^i, $i = a, b$, as well as the "level of general government activity", g_g, a public good. In each period t, type i receives an endowment w_t^i that can be consumed or saved. Taxes are levied in proportion to contemporary endowment at tax rate τ_t. Taxes induce a deadweight burden, given by the strictly convex function $h(\tau_t)$ with $h(0) = h'(0) = 0$ (cf. Barro, 1979; Bohn, 1990). (Later, I will endogenize the efficiency cost of taxation by explicitly modeling the labor leisure tradeoff of the households.)

For any given government policy $\pi \equiv (\tau_0, \tau_1, g_g)$, a household of type i maximizes welfare $\sum_{t=0}^{1} \beta^t (\ln(c_t^i) + \xi^i \ln(g_g))$ subject to its intertemporal budget constraint $\sum_{t=0}^{1} \beta^t c_t^i = W^i(\tau_0, \tau_1)$, where $W^i(\cdot)$ denotes wealth, i.e., the discounted sum of endowments after taxes and deadweight burdens:

$$W^i(\tau_0, \tau_1) \equiv \sum_{t=0}^{1} \beta^t w_t^i (1 - \tau_t - h(\tau_t)). \tag{1}$$

[2] These effects also arise in economies inhabited by different generations, cf. Diamond (1965), Barro (1974), Blanchard (1985), and Auerbach, Gokhale and Kotlikoff (1991). In this paper, I exclusively focus on *intra*-generational conflicts.

The indirect utility function of type i is given by

$$U^i = (1+\beta)\left[\ln\left(\frac{W^i(\tau_0,\tau_1)}{1+\beta}\right) + \xi^i \ln(g_g)\right].$$

Since the economy is open, it faces no period by period resource constraint. The government's choice of π is therefore only restricted by the intertemporal budget constraint

$$\sum_{t=0}^{1} \beta^t[\tau_t(\eta w_t^a + (1-\eta)w_t^b) - g_t] = 0. \tag{2}$$

Here, g_t denotes the total resource requirement of the government at time t. This total resource requirement is the sum of g_g, determined in the political process, and an exogenous component g_{et}:[3]

$$g_t = g_g + g_{et},\ \ t = 0, 1.$$

The latter component captures those expenditures that are not—or to a lesser extent than g_g—under government control, for example defense spending.

To close the model, the political process needs to be specified. I assume that the government chooses policy π in order to maximize a weighted average of households' welfare measures, $\theta^a\eta U^a + \theta^b(1-\eta)U^b$, where the per capita weights are given by θ^a and θ^b. This objective function can be interpreted as that of a utilitarian social planner (a Benthamite planner if $\theta^a = \theta^b$). Alternatively, it provides an approximation to the political decision-making process. For example, the objective function applies if the government maximizes the welfare of one type subject to a reservation utility requirement for the other type[4], or when the median voter is decisive[5].

Household heterogeneity introduces two dimensions of conflict in this economy. First, differences between the endowment growth rates of the two types imply that the timing of tax collections not only affects the deadweight burden but also the distribution of tax burdens across groups.[6] Suppose that we start from a situation with equal tax rates in the two periods, $\tau_0 = \tau_1 = \tau$. Relative wealth then equals

$$\frac{W^a(\tau,\tau)}{W^b(\tau,\tau)} = \frac{w_0^a + \beta w_1^a}{w_0^b + \beta w_1^b}.$$

A marginal increase in τ_0 and a corresponding decrease in τ_1 (to balance the government's intertemporal budget constraint) change the wealth level of household i by

$$\frac{dW^i(\tau,\tau)}{d\tau_0} = (-1 - h'(\tau))(w_0^i - w_1^i z_0/z_1),$$

where $z_t \equiv \eta w_t^a + (1-\eta)w_t^b$. These wealth effects generally differ across groups and are not proportional to the initial wealth levels. A policy change thus affects the wealth distribution.

[3] The exogeneity assumption can be weakened to the assumption that g_{et} is positively related to the level of g_g.

[4] Denote welfare of type i by U^i. The government's problem, P say, is to maximize, for some positive weights θ^a and θ^b, the objective function $\theta^a\eta U^a + \theta^b(1-\eta)U^b$ subject to C, the set of resource and implementability constraints. Let $U^{a\star}$ and $U^{b\star}$ be the welfare levels and A the allocation that solves P. Then, $U^{a\star}$, $U^{b\star}$, and A also solve the problem, P' say, of maximizing U^a subject to C and $U^b \geq U^{b\star}$. (Otherwise A cannot be optimal in P.) The converse holds if the utility possibility set is convex.

[5] For $\eta > 0.5$, the median voter setup implies $\theta^b = 0$ and vice versa.

[6] Note that this effect arises absent any form of generational heterogeneity.

This does not depend on the flat initial tax profile but solely hinges on the fact that the income growth rates differ across types. (The availability of non-linear taxes would not alter this conclusion, cf. Niepelt (2003).) For any given level of total tax revenue, different income growth rates thus introduce conflicting interests with respect to the time profile of tax rates. Household preferences with respect to this time profile are single peaked:

Proposition 1. For a given level of taxation $G \equiv g_0 + \beta g_1$, preferences with respect to the slope of the tax profile are single peaked.

Proof. $\tau_1 = (G - \tau_0 z_0)/(\beta z_1)$ and $\partial\tau_1/\partial\tau_0 = -z_0/(\beta z_1)$. It follows that

$$\frac{dW^i(\tau_0, \tau_1)}{d\tau_0} = w_0^i(-1 - h'(\tau_0)) + w_1^i(1 + h'(\tau_1))z_0/z_1.$$

Household i therefore prefers the tax profile satisfying

$$\frac{1 + h'(\tau_0)}{1 + h'(\tau_1)} = \frac{w_1^i z_0}{w_0^i z_1} \tag{3}$$

subject to (2). Since an increase in τ_0 is associated with a decrease in τ_1 (and vice versa), this preferred tax profile is uniquely defined. Moreover, $d^2W^i(\cdot)/(d\tau_0)^2 < 0$. Preferences are thus single peaked in τ_0 and also in τ_1/τ_0. □

The second dimension of conflict relates to the level of taxation. Holding a certain time profile of tax rates constant, different preferences with respect to g_g or different endowment growth rates cause households to disagree about the desired level of taxation and government spending:

Proposition 2. For a given time profile of tax rates, preferences with respect to the level of g_g are single peaked.

Proof. Fix $\alpha \equiv \tau_1/\tau_0$ and let $\delta^i \equiv w_1^i/w_0^i$. Then, $\tau_0 = ((1+\beta)g_g + g_{e0} + \beta g_{e1})/(z_0 + \alpha\beta z_1)$. It follows that

$$\frac{dU^i}{dg_g} = (1+\beta)\left(\frac{(-1 - h'(\tau_0)) + \alpha\beta\delta^i(-1 - h'(\alpha\tau_0))}{(1 - \tau_0 - h(\tau_0)) + \beta\delta^i(1 - \alpha\tau_0 - h(\alpha\tau_0))}\frac{(1+\beta)^2}{z_0 + \alpha\beta z_1} + \frac{\xi^i}{g_g}\right).$$

The preferred level of government activity for household i thus satisfies

$$g_g = \xi^i \frac{z_0 + \alpha\beta z_1}{(1+\beta)^2}\frac{(1 - \tau_0 - h(\tau_0)) + \beta\delta^i(1 - \alpha\tau_0 - h(\alpha\tau_0))}{(1 + h'(\tau_0)) + \alpha\beta\delta^i(1 + h'(\alpha\tau_0))}$$

and (2). Since an increase in g_g must be accompanied by an increase in τ_0 and since the left-hand side (right-hand side) of this equation is increasing in g_g (decreasing in τ_0), the preferred level of g_g is uniquely defined. Furthermore, $d^2U^i/(dg_g)^2 < 0$. Preferences are thus single peaked in g_g. □

Suppose that a BB rule is introduced in this economy. The requirement to finance government spending out of contemporary tax revenues reduces the degrees of freedom in the maximization problem of the government from two to one: Once g_g is chosen, τ_0 and τ_1 follow directly from the BB constraint. The value of the government's problem is therefore weakly lower than in the problem without a BB requirement. Why then would a specific group of households have an interest in a BB requirement? Four conditions must be satisfied:

(a) The group and the government must disagree about the optimal policy to be implemented. Only then does it make sense for the interest group to support constraints on the government's choice variables. In the setup considered here, this requirement for different objective functions is satisfied as soon as the two types prefer different fiscal policies and the government places positive weight on the welfare of each type.

(b) The welfare of the group must be higher under the constrained than under the unconstrained policy. This condition can be satisfied in two ways: either because a change in the tax profile from that under the unrestricted financial policy to that under a BB rule shifts tax burdens across groups, and households with a preferred tax profile close to that under a BB rule benefit from this effect; or because a BB requirement affects the net benefits from government spending. Since the BB requirement weakly increases the cost of financing, the government chooses a weakly lower g_g under a BB rule than under the unrestricted financial policy. If households care differently about g_g ($\xi^a \neq \xi^b$) or face unequal growth rates of their endowment streams, the welfare effects of such a reduction in g_g are asymmetric. A type who values g_g significantly less than the government benefits from a BB requirement if its disadvantages—lower g_g and higher tax distortions per tax revenue—are more than compensated by the advantage of lower tax payments.

(c) A BB requirement must be enacted on a higher legislative level than the budget itself, in order to truly represent a constraint to the government. Following the literature (cf. Alesina and Perotti, 1995; Alesina and Perotti, 1996; Poterba and von Hagen, 1999) I assume that this realistic assumption is satisfied. However, this triggers the question of what the political power constellation must be like for restrictions to be enacted on the constitutional level that constrain the behavior on the legislative level. One possible explanation follows the argument of Persson and Svensson (1989) in emphasizing an anticipated change in the distribution of power. Imagine that the ruling party commands a broad majority of the votes in the legislative branch. This majority allows the party to change the constitution. Furthermore, imagine that the party expects to lose this broad majority in the upcoming election and to share power with other parties in a coalition government. If the party is "fiscally conservative", it might want to enact a BB requirement in order to permanently constrain subsequent decision makers.

(d) There must only be a few budgetary institutions available that are simple and transparent enough to be practicable and credible (cf. Buchanan and Wagner, 1977, p. 176). If more than just a few such institutions were available, an interest group would try to enact a different, more efficient, constraint than a BB rule.[7] That such a constraint exists can be seen from there always being a modified pair of welfare weights, such that the optimal allocation, subject to these weights, Pareto dominates the allocation under a BB. I assume throughout the paper that the available constitutional constraints consist only of either a BB requirement or none.

The previous argument implies that in a realistic legislative framework, elementary forms of household heterogeneity explain why some, but not all, groups within a cohort support constitutional restrictions on financial policy. The purpose of the following section is to analyze in more detail the distributive conflicts that create this support. I enrich the model along several dimensions. Most importantly, I endogenize the deadweight burden by modeling households'

[7] See Acemoglu and Robinson (2001) for a model of inefficient redistribution.

labor-leisure tradeoff. Furthermore, I abandon the assumption of a small open economy and take the general equilibrium effects of policy changes explicitly into account.

3 Incidence of Fiscal Policy in General Equilibrium

I start by deriving the equilibrium allocation as a function of the government policy instruments, both with and without a BB requirement. Thereafter, I analyze the welfare effects due to the introduction or abolition of a BB rule.

3.1 The Model

The economy is closed.[8] As in Lucas and Stokey (1983), it consists of a government and a continuum of households of measure one. Households live from period 0 to period T.[9] Both the government and the households possess perfect information about the joint distribution of all relevant exogenous variables. I denote a realization of these exogenous variables at time t by ϵ_t and a specific history of realizations of ϵ_t between dates r and s, $\{\epsilon_t\}_{t=r}^{s}$, by ϵ_r^s. In the case of $r = 0$, I write ϵ^s. The realizations of ϵ_t between dates r and s are distributed according to the distribution function $F_r^s(\epsilon_r^s)$ with the density (or, if applicable, probability) function $f_r^s(\epsilon_r^s)$. Contracts are written at time 0 after ϵ_0 is observed.

The population is split into two groups: Type a households amount to a fraction η of the consumers ($0 \leq \eta \leq 1$), and type b households to a fraction $1 - \eta$. The welfare of a household is defined by the expected value of the discounted (by factor β^t) sum of the felicity functions. The latter are given by $u(c_t^a, x_t^a, g_g) \equiv \ln(c_t^a) + \gamma^a \ln(x_t^a) + \xi^a \ln(g_g)$ for a-types and $v(c_t^b, x_t^b, g_g) \equiv \ln(c_t^b) + \gamma^b \ln(x_t^b) + \xi^b \ln(g_g)$ for b-types. c_t^i and x_t^i denote type i's consumption at time t of the single good and leisure, respectively; g_g denotes the "level of general government activity"; and $\gamma^i > 0, \xi^i \geq 0$, $i = a, b$. Each household is endowed with one unit of time per period. Production is linear in labor with productivities $w_t^i \in \epsilon_t, i = a, b$. For notational convenience, I define $w_t \equiv w_t^a/w_t^b$, $\gamma \equiv \gamma^a/\gamma^b$, $c_t \equiv c_t^a/c_t^b$, and $x_t \equiv x_t^a/x_t^b$.

Vector ϵ_t contains the government's resource requirement $g_t \equiv g_g + g_{et}$ financed out of contingent taxes and contingent government deficits. Because the government only observes a household's labor income, but not its type, productivity, or labor supply, it must resort to a uniform labor income tax schedule.[10] For simplicity, I follow the standard approach in the literature and assume a proportional labor income tax such that average and marginal tax rates are identical.[11]

Households behave competitively. They take the sequence of contingent prices of the consumption good $\{p_t(\epsilon^t)\}_{t=0}^{T}$ and the contingent tax plan $\{\tau_t(\epsilon^t)\}_{t=0}^{T}$ as given and plan consumption $\{c_t{}^i(\epsilon^t), x_t{}^i(\epsilon^t)\}_{t=0}^{T}, i = a, b$, and holdings of contingent claims in order to maximize the expected utility. (As indicated by the notation, all endogenous variables at time t are functions of the history of the exogenous variables up to t. To simplify the notation, I write these functions without their argument from now on.)

A competitive equilibrium in this economy consists of a contingent tax plan, a contingent

[8] The model builds on previous work in Niepelt (2003).
[9] The arguments are not affected if T is replaced by ∞ and the following conditions are modified accordingly.
[10] Cf. Atkinson and Stiglitz (1976).
[11] This assumption can be relaxed, see Niepelt (2003).

price sequence, and contingent consumption choices satisfying the economy's resource constraints

$$e_t \equiv \eta w_t^a + (1-\eta)w_t^b - g_t = \eta(c_t^a + w_t^a x_t^a) + (1-\eta)(c_t^b + w_t^b x_t^b), \ \forall \epsilon^t, t = 0,1,2,\ldots,T, \quad (4)$$
$$0 \leq x_t^i \leq 1, i = a, b, \ \forall \epsilon^t, t = 0,1,2,\ldots,T,$$

the budget constraints of the households and the government, and corresponding with utility maximization by consumers. I assume that government expenditure is always feasible, $e_t > 0, \ \forall \epsilon^t, t = 0,1,2,\ldots,T$[12], and that equilibria are interior. In equilibrium, a temporary government budget deficit is matched by savings in the private sector. The government's intertemporal budget constraint is satisfied whenever the households' budget constraints and the aggregate resource constraints are met.

The weighted—by $\theta^a\eta$ and $\theta^b(1-\eta)$—sum of the expected utilities of the two types defines the government's objective function. The policy instruments π consist of g_g as well as a contingent tax plan. Among all policies π that result in a competitive equilibrium, the government chooses one maximizing its objective function.[13]

A household of type i solves the following problem:[14]

$$\max_{\{c_t^i, x_t^i\}_{t=0}^T} \quad \sum_{t=0}^{T} \beta^t \int \ln(c_t^i) + \gamma^i \ln(x_t^i) + \xi^i \ln(g_g) \ dF_0^t(\epsilon^t|\epsilon_0)$$
$$\text{s.t.} \quad \sum_{t=0}^{T} \int p_t(1-\tau_t)w_t^i d\epsilon^t = \sum_{t=0}^{T} \int p_t[c_t^i + (1-\tau_t)w_t^i x_t^i]d\epsilon^t.$$

The first-order conditions of this problem define the household's consumption and leisure choices as functions of productivities, tax rates, and prices. Substituting out prices and tax rates reduces these first-order conditions to implementability constraints which are presented in the appendix.

Combining the implementability constraints with the resource constraint and the government's intertemporal budget constraint yields the equilibrium allocation as a function of the government's choice variables (see the appendix for derivations). Under a BB rule, the government's policy choice involves one degree of freedom since the choice of g_g determines all tax rates. Under no BB rule, it involves multiple degrees of freedom since the government can choose g_g and shift tax collections across time and states of nature. For the latter case, without loss of generality, I choose $x_t^b, \ \forall \epsilon^t, t = 1,2,\ldots,T$, to represent the policy instruments the government gains in addition to g_g. (Since tax rates have been substituted out, the "real" policy instruments are no longer present in the equation system. However, a specific policy choice with respect to the instruments $x_t^b, \ \forall \epsilon^t, t = 1,2,\ldots,T$, corresponds exactly to a specific choice of these "real"

[12] This implicitly defines a maximal value for g_g. I assume that the government never wants to implement a value higher than that maximum.

[13] I neglect issues of time consistency and assume that the government is able to commit to this ex ante optimal policy. An extension of the argument in Lucas and Stokey (1983) shows that this assumption can be relaxed to the assumption that the government commits to honoring government debt, and that it has access to a wide range of maturities.

[14] For simplicity, I assume that no debt is outstanding at the beginning of period 0.

instruments.) The equilibrium allocation under a BB rule is then given by[15]

$$
\begin{aligned}
\bar{g}_g & \quad \text{policy instrument,} \\
\bar{c} &= \frac{1+\gamma^b}{1+\gamma^a}\frac{B-(1-\eta)\Omega}{\eta\Omega}, && (5) \\
\bar{x}_t^b &= \frac{\gamma^b}{1+\gamma^b}\frac{\eta w_t+1-\eta}{B}\Omega,\ \forall\epsilon^t, t=0,1,2,\ldots,T, && (6) \\
\bar{c}_t^b &= \frac{(\eta w_t^a+(1-\eta)w_t^b)(1+(1-\eta)\frac{\Omega}{B}\frac{\gamma^a-\gamma^b}{1+\gamma^b})-g_t(1+\gamma^a)}{(1+\gamma^b)(\frac{B}{\Omega}-(1-\eta))+(1-\eta)(1+\gamma^a)},\ \forall\epsilon^t, t=0,1,2,\ldots,T, && (7) \\
\bar{c}_t^a &= \bar{c}_t^b\bar{c},\ \forall\epsilon^t, t=0,1,2,\ldots,T, \\
\bar{x}_t^a &= \bar{x}_t^b\bar{c}\gamma/w_t,\ \forall\epsilon^t, t=0,1,2,\ldots,T, \\
\Omega &\equiv \sum_{t=0}^{T}\beta^t\int(\eta w_t+1-\eta)^{-1}dF_0^t(\epsilon^t|\epsilon_0),\ B\equiv\sum_{t=0}^{T}\beta^t.
\end{aligned}
$$

In the absence of a BB rule, the equilibrium allocation satisfies

$$
\begin{aligned}
g_g & \quad \text{policy instrument,} \\
x_t^b & \quad \text{policy instruments, } \forall\epsilon^t, t=1,2,\ldots,T, \\
x_0^b &= \left(\frac{1+\gamma^b}{\gamma^b}B-\sum_{t=1}^{T}\beta^t\int\frac{1}{x_t^b}dF_0^t(\epsilon^t|\epsilon_0)\right)^{-1}, && (8) \\
c &= w_0\frac{1+\gamma^b}{1+\gamma^a}+\frac{\gamma^b}{1+\gamma^a}\frac{1}{B}\sum_{t=1}^{T}\beta^t\int\frac{w_t-w_0}{x_t^b}dF_0^t(\epsilon^t|\epsilon_0), && (9) \\
c_t^b &= \frac{e_t-x_t^bw_t^b(\eta c(\cdot)\gamma+1-\eta)}{\eta c(\cdot)+1-\eta},\ \forall\epsilon^t, t=1,2,\ldots,T, && (10) \\
c_0^b &= \frac{e_0-x_0^b(\cdot)w_0^b(\eta c(\cdot)\gamma+1-\eta)}{\eta c(\cdot)+1-\eta}, && (11) \\
c_t^a &= c_t^b(\cdot)c(\cdot),\ \forall\epsilon^t, t=0,1,2,\ldots,T, \\
x_t^a &= x_t^bc(\cdot)\gamma/w_t,\ \forall\epsilon^t, t=1,2,\ldots,T, \\
x_0^a &= x_0^b(\cdot)c(\cdot)\gamma/w_t,
\end{aligned}
$$

where it is understood that $c(\cdot)$, $c_t^b(\cdot)$, and $x_0^b(\cdot)$ depend on g_g and x_t^b, $\forall\epsilon^t, t=1,2,\ldots,T$, according to (8)–(10).

Equation (9) captures the tax shifting result in general equilibrium: Relative consumption (which is proportional to relative wealth) can only be affected by the timing of tax collections if the relative labor productivities differ across time or states of nature. (If relative productivity is constant, $w_t=w_0$, $\forall\epsilon^t, t=1,2,\ldots,T$, then the second term on the right-hand side of equation (9) equals zero; relative consumption thus is fixed and proportional to w_0, independent of policy.) Suppose, for example, that a-types are very productive (in relative terms) in state ϵ^t, $w_t>w_0$. Equation (9) says that, under these circumstances, a-types benefit from a decrease in $x_t^b(\epsilon^t)$, i.e., a decrease in the tax rate $\tau_t(\epsilon^t)$.

[15] For any variable q_t, let $\bar{q}_t$ denote the value of this variable resulting under a BB policy.

The government's optimal choice of policy instruments under no BB rule maximizes its objective function, subject to the constraints governing the allocation under no BB rule. In equilibrium, this objective function can be expressed without explicit reference to c_t^a and x_t^a because (using (20) and (21) in the appendix)

$$u(c_t^a, x_t^a, g_g) = v(c_t^b, x_t^b, g_g) + (\gamma^a - \gamma^b)\ln(x_t^b) + (1+\gamma^a)\ln(c) + \gamma^a \ln(\gamma/w_t) + (\xi^a - \xi^b)\ln(g_g).$$

The government program therefore reads[16]

$$\begin{aligned} \max_{g_g, \{x_t^b\}_{t=1}^T} \quad & \sum_{t=0}^{T} \beta^t \int (\theta^a\eta + \theta^b(1-\eta)) \left[\ln(c_t^b) + \gamma^b \ln(x_t^b) + \xi^b \ln(g_g)\right] + \\ & \theta^a\eta \left[(\gamma^a - \gamma^b)\ln(x_t^b) + (1+\gamma^a)\ln(c) + \gamma^a\ln(\gamma/w_t) + (\xi^a - \xi^b)\ln(g_g)\right] dF_0^t(\epsilon^t|\epsilon_0) \\ \text{s.t.} \quad & (8), (9), (10), (11). \end{aligned} \tag{12}$$

Substituting (8)–(11) into the objective function and differentiating with respect to the policy instruments, a typical first-order condition with respect to x_t^b takes the form $\sum_{j=1}^3 D_{jt} = 0$ where

$$\begin{aligned} D_{1t} &\equiv (\theta^a\eta + \theta^b(1-\eta)) \left[\beta^t f_0^t(\epsilon^t|\epsilon_0)\left(\frac{1}{c_t^b}\frac{\partial c_t^b}{\partial x_t^b} + \frac{\gamma^b}{x_t^b}\right) + \left(\frac{1}{c_0^b}\frac{\partial c_0^b}{\partial x_0^b} + \frac{\gamma^b}{x_0^b}\right)\frac{\partial x_0^b}{\partial x_t^b}\right], \\ D_{2t} &\equiv \left\{(\theta^a\eta + \theta^b(1-\eta))\left[\sum_{s=0}^{T}\beta^s \int \frac{1}{c_s^b}\frac{\partial c_s^b}{\partial c} dF_0^s(\epsilon^s|\epsilon_0)\right] + \theta^a\eta\left[(1+\gamma^a)B\frac{1}{c}\right]\right\}\frac{\partial c}{\partial x_t^b}, \\ D_{3t} &\equiv \theta^a\eta\left[(\gamma^a - \gamma^b)\left(\beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{1}{x_t^b} + \frac{1}{x_0^b}\frac{\partial x_0^b}{\partial x_t^b}\right)\right]. \end{aligned}$$

The first-order condition with respect to g_g reads

$$B\frac{\theta^a\eta\xi^a + \theta^b(1-\eta)\xi^b}{\theta^a\eta + \theta^b(1-\eta)} = g_g \sum_{t=0}^{T}\beta^t \int \frac{1}{e_t - x_t^b w_t^b(\eta c\gamma + 1 - \eta)} dF_0^t(\epsilon^t|\epsilon_0). \tag{13}$$

The terms D_{1t}, D_{2t}, and D_{3t} summarize the social welfare implications of a change in the tax rate—as represented by x_t^b—in general equilibrium: An increase in leisure of b-types goes hand in hand with a decrease in goods consumption. Furthermore, the change in x_t^b must be accompanied by a variation in x_0^b (and therefore c_0^b) to be implementable. D_{1t} accounts for these four effects, holding the wealth distribution across types constant, and thus captures the marginal social welfare effect of tax smoothing as it arises in the representative agent setup. D_{3t} corrects for type-specific differences in the preference for leisure. D_{2t} measures the social welfare effect of a change in relative wealth. It represents the distributive channel that works through the changes in the relative tax burden, and the induced general equilibrium effects on prices.[17]

The first-order condition with respect to g_g postulates that the social marginal rate of substitution between government spending and private consumption equals the corresponding social marginal rate of transformation.

The government's optimal choice of policy instruments under a BB rule maximizes its objective function, subject to the constraints governing the allocation under a BB rule. These constraints leave the government with only one degree of freedom, corresponding to the choice of g_g. The only optimality condition under a BB requirement is thus (13) subject to (5), (6), and (7).

[16] I neglect the inequality constraints in (4).

[17] See Niepelt (2003) for a detailed discussion.

3.2 Effects of a Balanced Budget Requirement

Section 2 pointed out two ways in which a BB requirement resolves intra-generational distributive conflicts, one effect concerning the revenue side, the other the expenditure side of the government budget. The purpose of this subsection is to analyze these two effects in more detail in the framework of the general equilibrium model outlined above. I conduct the analysis in two parts. First, I discuss the tax shifting channel of financial policy and then I analyze the effect of a BB requirement on the level of government activity.

Before doing so, it is necessary to characterize the distributive conflicts more sharply. The following three results are useful in that context. Their proofs are deferred to the appendix.

Proposition 3. If the ratio of the productivities of the two types is constant, a marginal change in the tax plan around the BB allocation has a symmetrical effect on households. No distributive conflict arises and, as in the representative agent case, the optimal financial policy is solely guided by the motivation to minimize the deadweight burden.

Proposition 3 describes the rare situation where no tax shifting effect arises. The result crucially depends on the assumptions about the utility function, relative productivity, and initial policy: First, with constant relative productivities, the relative wealth of the two types is not affected by the financial policy. Second, around the BB allocation, utility does not change with a small variation in leisure in periods t and 0, due to the fact that fixed relative productivities imply a constant labor supply of each type (cf. equation (6)). Finally, with c independent of the financial policy, the effect on welfare through changes in consumption is symmetric for both types. Although this result only holds for marginal changes around the BB allocation, it provides a useful benchmark: If relative productivities do not vary over time and states, households agree—to a first approximation—about the preferred timing of tax collections.

Consider next the case where households have identical preferences but different labor productivity profiles. Let $Q_t \equiv g_t(e_t - g_t\gamma^b)^{-1}$. Q_t is proportional to the deadweight burden in period t. Let $\tilde{Q}$ satisfy

$$\tilde{Q}\sum_{t=0}^{T}\beta^t = \sum_{t=0}^{T}\beta^t \int Q_t dF_0^t(\epsilon^t|\epsilon_0).$$

Proposition 4. Suppose $\gamma = 1$. Suppose furthermore that $0 < \eta < 1$. Consider a marginal increase in x_t^b around the BB allocation. The welfare effect on a- and b-types, U_γ and V_γ respectively, is given by

$$\begin{aligned}
U_\gamma &= \beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{(1+\gamma^b)^2}{(\eta w_t + 1 - \eta)^2}\frac{B}{\Omega} \\
&\times \left\{\eta(w_t - w_0)\left[\tilde{Q} + \frac{1}{\gamma^b}\left(1 - \frac{B}{B-(1-\eta)\Omega}\right)\right] - [Q_t(\eta w_t + 1 - \eta) - Q_0(\eta w_0 + 1 - \eta)]\right\}, \\
V_\gamma &= \beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{(1+\gamma^b)^2}{(\eta w_t + 1 - \eta)^2}\frac{B}{\Omega} \\
&\times \left\{\eta(w_t - w_0)\left[\tilde{Q} + \frac{1}{\gamma^b}\right] - [Q_t(\eta w_t + 1 - \eta) - Q_0(\eta w_0 + 1 - \eta)]\right\},
\end{aligned}$$

where

$$\left(1 - \frac{B}{B-(1-\eta)\Omega}\right) < 0.$$

U_γ and V_γ consist of two parts each. The second part, containing the weighted difference between Q_t and Q_0, represents the effect of the policy change on the excess burden. Since $\gamma = 1$, both types are symmetrically affected through this channel. The first part, containing the difference $w_t - w_0$, represents the wealth effects of a change in the tax profile, which differs across types whenever $w_t \neq w_0$. The desirability of a change in financial policy therefore depends on the weights in the social welfare function and the relative size of the wealth and excess burden effects.

Finally, we have

Proposition 5. With identical preferences and no variation in Q_t[18] a marginal change in financial policy around the BB allocation is purely distributive, in proportion to the difference between w_t and w_0.

3.2.1 Shifting Taxes

Suppose that all households have identical preferences and do not value government activity: $\gamma = 1, \xi^a = \xi^b = 0$. Independent of the fiscal constitution, the government then chooses $g_g = 0$. Distributive conflicts only arise due to the tax shifting channel of financial policy. Consider a marginal change in the timing of tax collections around the allocation under a BB rule. If this policy shift involves losses for some group in the population—a-types' welfare falls, say—although it improves the government's objective function (i.e. $\sum_{j=1}^{3} D_{jt} > 0$) a-types favor a BB requirement.[19]

A simple two-period example illustrates this point.[20] Consider a marginal increase of x_1^b around the BB allocation. This policy shift corresponds to a marginal increase in the tax rate in period 1, accompanied by a reduction in the period 0 tax rate. The welfare effects on a- and b-types are given by U_γ and V_γ (cf. Proposition 4) with t-indices replaced by 1, $\tilde{Q} = (Q_0 + Q_1\beta)/(1+\beta)$, and $f_0^t(\epsilon^t|\epsilon_0) = 1$. Figure 1 illustrates these welfare effects as well as the social welfare effect S_γ for different values of w_1^b and g_1. Without loss of generality, I have assumed that $\eta w_t^a + (1-\eta)w_t^b$ is constant over time. Furthermore, I have chosen the following parameter values: $\theta^a = \theta^b = 1$; $\eta = 0.5$; $\beta = 0.95$; $\gamma^a = \gamma^b = 1$; $w_0^a = w_0^b = 4$; $g_0 = 0.6 - g_1$.

Consider first points along the line $w_1^b = 4$, where relative productivities are constant over time. It follows from Proposition 3 that a small policy change affects the two households symmetrically—independent of the value of g_1. Without distributive effects of financial policy, the implications of a change in the timing of tax collections are equivalent to those in the representative agent setup: Only the tax smoothing aspect is of importance. For a high g_1 (such that $g_0 < g_1$), a marginal increase in x_1^b reduces the welfare of both types; for a low g_1, the opposite result holds. The left and middle plots in the lower panel of Figure 1 capture this result: The line $w_1^b = 4$ intersects with the contour lines of U_γ and V_γ at the same levels of g_1.

If both $w_1^b = 4$ (such that $w_0 = w_1 = 1$) and $g_1 = 0.3$ (such that $g_0 = g_1$), government expenditure and relative endowments are constant over time. It follows (cf. Propositions 3, 4, and 5) that a marginal policy change around the BB allocation has zero welfare effects.

With $g_1 = 0.3$ (such that $g_0 = g_1$), household welfare would be maximized under a BB if the economy were inhabited by a representative agent. With distinct income growth rates, this

[18]A sufficient condition for no variation in Q_t is that g_t is proportional to e_t.

[19]Even if the policy change initially benefits all households, it generally involves, from some point, a distributive conflict. This conflict is only absent if the solution to program (12) is independent of the welfare weights.

[20]In the quantitative examples I assume, for simplicity, that ϵ_t is deterministic and $T = 1$. This is equivalent to a situation with $T > 1$ and a cyclical ϵ_t of frequency one half.

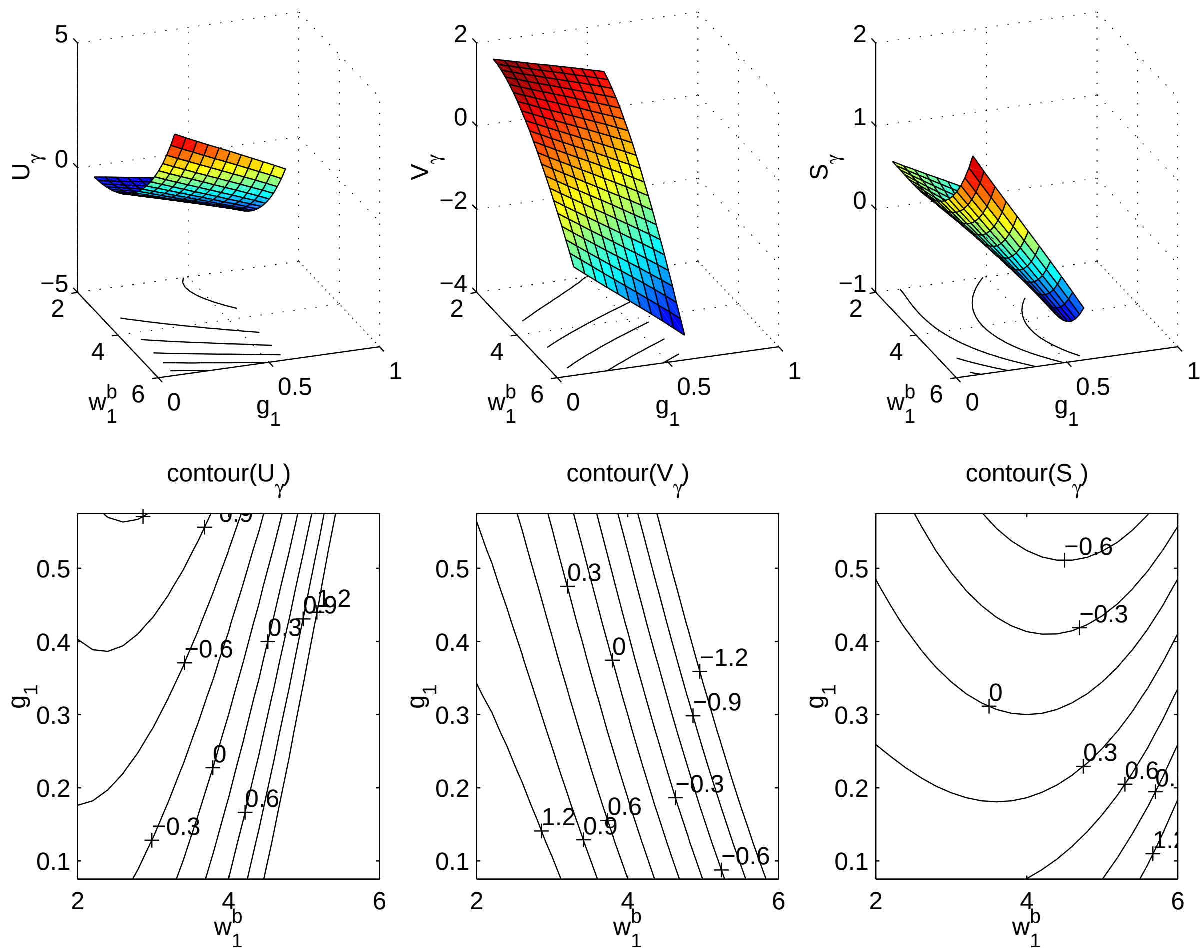

Figure 1: Welfare effects of a marginal increase in x_1^b for different values of w_1^b and g_1

is not the case. As soon as $w_0 \neq w_1$, the interests of the two types are strictly opposed. The left and middle plots in the lower panel of Figure 1 show that the marginal welfare effects along the line $g_1 = 0.3$ have opposite signs. With such starkly opposing individual interests, the government's optimal policy is solely determined by distributive considerations (cf. Proposition 5): As soon as $w_1^b \neq 4$ (such that $w_0 \neq w_1$), a marginal increase in x_1^b increases the welfare of the relatively poor household, reduces the welfare of the relatively rich household, and increases social welfare (because the welfare weights for both types and their fractions in the population are identical). The intensity of the distributive conflict between a- and b-types increases in the absolute deviation of w_1^b from 4, i.e., in the absolute difference between w_0 and w_1. It is the distributive motive of financial policy that yields the non-zero slope of the contour lines of S_γ at $g_1 = 0.3$. In contrast, the conventional tax smoothing motive induces the negative slope of S_γ in the direction of an increasing g_1.

The contour graphs clearly illustrate under which circumstances the government and either of the two groups disagree about the preferred sign of a marginal policy change. (Recall that it is in these cases that the respective group necessarily prefers a BB requirement.) For low values of both w_1^b and g_1 (such that $w_1^a > w_1^b$ and $g_0 > g_1$), the marginal policy shift around the BB allocation harms a-types. Although the increase in the period 1 tax rate is beneficial to all households for tax smoothing reasons (tax rates become flatter than under a BB rule), a-types suffer due to the tax shifting effect of the policy change. b-types, on the other hand, benefit from the tax increase in period 1 for both tax shifting and tax smoothing reasons. The aggregate effect on social welfare is positive, given the specific objective function of the government. The government's interest is thus not aligned with a-types' interests. A similar conflict between b-types and the government arises for high values of w_1^b and low values of g_1.

For low values of w_1^b and high values of g_1 (such that $w_1^a > w_1^b$ and $g_0 < g_1$), a marginal increase in the period 1 tax rate harms a-types for both tax shifting and tax smoothing reasons. b-types benefit, since the tax shifting effect outweighs the negative impact of more volatile deadweight burdens. Since the social welfare effect is negative, the government's and b-types' interests are not aligned. A similar conflict arises between a-types and the government if w_1^b and g_1 are high.

There are only few circumstances in which the interests of both groups and the government are aligned. In most of the cases (i.e., either to the left of both types' 0-contour lines or to the right of both types' 0-contour lines) the welfare effects of tax shifting dominate those from tax smoothing, such that one of the two groups prefers a BB requirement.[21] This result is conservative in the sense that I have studied the welfare effects of a marginal policy change. Even if the welfare effects due to such a marginal policy change have identical signs, it is well possible that the welfare effects of a discrete policy change—from the allocation under a BB to that under the government's preferred policy—have opposite signs.

3.2.2 Reducing Government Spending

Assume now that the timing of tax collections has no effect on the distribution of tax burdens across groups, but that only a-types benefit from government activity, $\xi^a > \xi^b = 0$. b-types might then use a BB requirement to induce the government to cut spending. The mechanism at work is the following: For any given level of government expenditure, a BB requirement weakly increases the cost of financing. Under a BB rule, the government thus chooses a weakly lower level of g_g.[22] If b-types gain more from lower tax payments than they lose due to the higher variability of tax rates, they favor a BB requirement. In contrast, a-types do not. Although they also benefit from the lower tax payments under a BB rule, they suffer from both the increased variability of tax rates and the reduction of g_g.[23]

Consider the case $\gamma = 1$, $w_t^b = w_t^a = w^b$, $t = 0, 1$, (which excludes tax shifting considerations), and $g_{e1} > g_{e0}$. Condition (13) then reduces to

$$k_1 \equiv \xi^a B \frac{\theta^a \eta}{\theta^a \eta + \theta^b (1-\eta)} = g_g \sum_{t=0}^{1} \beta^t \frac{1}{w^b(1-x_t^b) - g_g - g_{et}} \equiv f(g_g, x_0^b, x_1^b),$$

where I denote constants by $k_i, i = 1, 2, \ldots$. Under a BB requirement, $x_t^b = \gamma^b/(1+\gamma^b)$, $t = 0, 1$. It follows that the choice of g_g under a BB rule, $\bar{g}_g$, solves

$$k_1 = \bar{g}_g \sum_{t=0}^{1} \beta^t \frac{1}{w^b/(1+\gamma^b) - \bar{g}_g - g_{et}}.$$

[21] Only for w_1^b close to 4 does the tax smoothing effect dominate the tax shifting effect.

[22] I assume that $\theta^a > 0$, $\eta > 0$.

[23] This mechanism is conceptually different from the one emphasized by Buchanan and Wagner (1977, p. 178): "The rule will have the effect of bringing the real costs of public outlays to the awareness of decision makers; it will tend to dispel the illusory 'something for nothing' aspects of fiscal choice."

Based on this result, one can approximate the marginal welfare effects around the BB allocation due to the abolition of a BB rule. Suppose that we start from the BB allocation and allow the government to issue debt (while keeping g_g fixed). Proposition 3 and $g_{e1} > g_{e0}$ imply that the government optimally increases x_0^b and reduces x_1^b, i.e., it implements a smoother tax profile. The welfare effect on both types due to such marginal tax smoothing is given (cf. Proposition 3) by

$$k_2 \equiv -\frac{\beta(1+\gamma^b)^2 w^b(g_0 - g_1)}{(w^b - g_0(1+\gamma^b))(w^b - g_1(1+\gamma^b))}.$$

Consider next the optimal adjustment of g_g once tax rates have been marginally smoothed. Taking the implementability constraint of b-types into account ($\partial\bar{x}_0^b/\partial x_1^b = -\beta$) one finds that

$$\frac{d\, f(\bar{g}_g, \bar{x}_0^b, \bar{x}_1^b)}{dx_1^b} = \bar{g}_g \beta w^b \left(\frac{1}{(\bar{c}_1^b)^2} - \frac{1}{(\bar{c}_0^b)^2}\right) \equiv k_3,$$

which is strictly positive since $w^b(1-x_t^b) > g_t$ and $g_1 > g_0$. Further, $f(\cdot)$ is increasing in g_g:

$$\frac{\partial f(\bar{g}_g, \bar{x}_0^b, \bar{x}_1^b)}{\partial g_g} = \frac{k_1}{\bar{g}_g} + \bar{g}_g\left(\frac{1}{(\bar{c}_0^b)^2} + \frac{\beta}{(\bar{c}_1^b)^2}\right) \equiv k_4 > 0.$$

To satisfy the first-order condition with respect to g_g, (13), government spending must therefore be adjusted in the opposite direction from x_1^b: g_g increases by

$$-\frac{dg_g}{dx_1^b} = \frac{k_3}{k_4}$$

and consumption decreases by the same amount. (This follows from the resource constraint (10) and $c = 1$, $\gamma = 1$.)

To summarize, a marginal decrease in x_1^b around the BB allocation results in welfare effects through three channels: Tax smoothing,

$$m^s \equiv k_2,$$

increased g_g,

$$m^g \equiv \frac{k_3}{k_4}\xi^a B \frac{1}{\bar{g}_g},$$

and lower consumption due to higher taxes to finance the increase in g_g,

$$m^t \equiv -\frac{k_3}{k_4}\left(\frac{1}{\bar{c}_0^b} + \frac{\beta}{\bar{c}_1^b}\right).$$

The total marginal welfare effects are given by $M^a \equiv m^s + m^g + m^t$ for a-types and $M^b \equiv m^s + m^t$ for b-types. The effect on social welfare is $M^s \equiv \theta^a \eta M^a + \theta^b(1-\eta)M^b$.

Figures 2 and 3 exemplify the impact of variations in ξ^a (Figure 2) and g_{e1} (Figure 3) on $\bar{g}_g$ (upper left panel); m^s, m^g, and m^t (upper right panel); M^a and M^b (lower left panel); and M^s (lower right panel).[24]

Consider first the case where ξ^a is varied and $g_{e1} = 0.2$. For $\xi^a = 0$, $\bar{g}_g = 0$, households are homogeneous, and the welfare of both groups increases with the abolition of a BB rule. Higher

[24] The parameter values in the simulation are $\theta^a = \theta^b = 1$; $\eta = 0.9$; $\beta = 0.95$; $\gamma^b = 1$; $w^b = 1$; $g_{e0} = 0$.

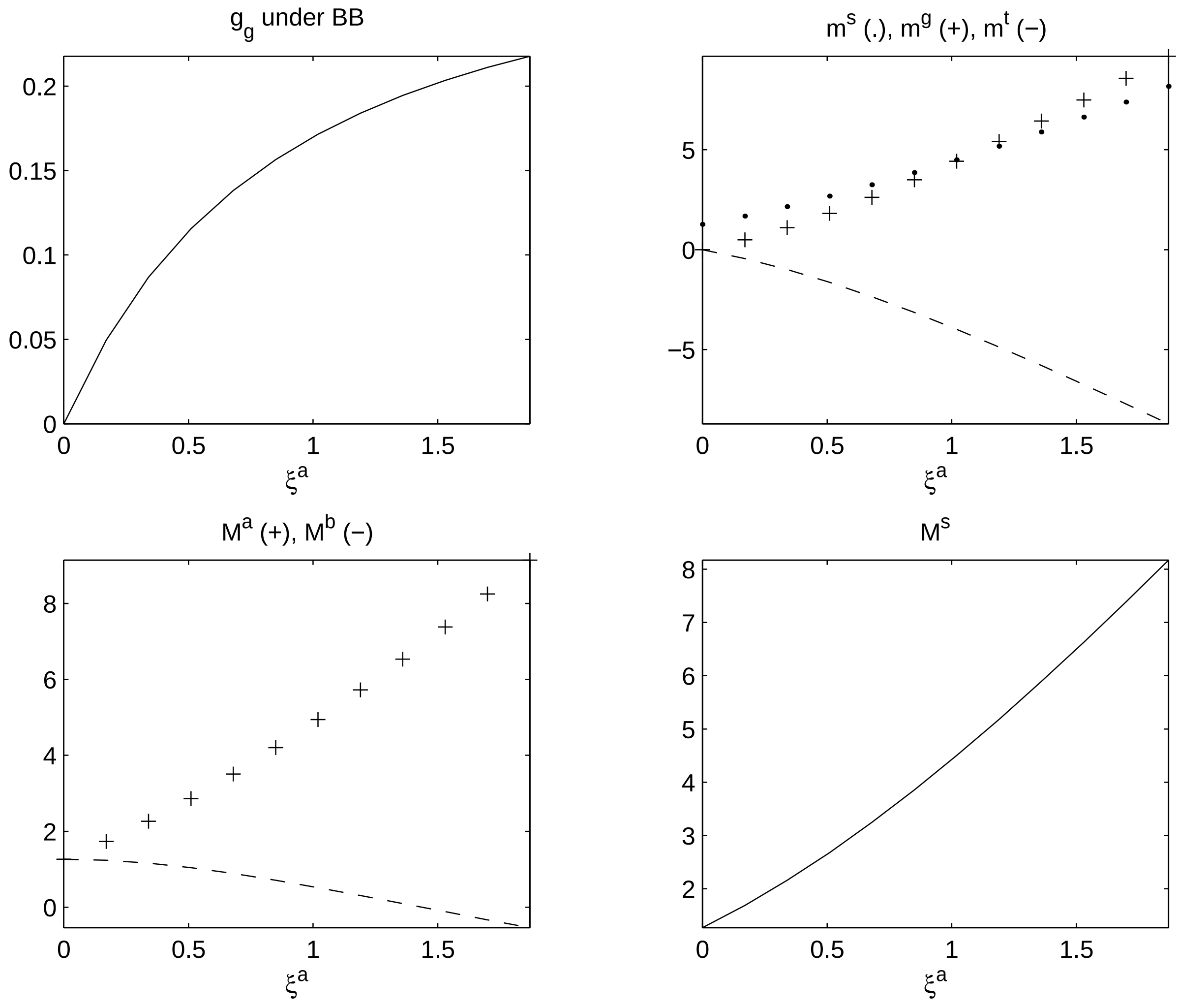

Figure 2: Effects of ξ^a

values of ξ^a increase $\bar{g}_g$ and lead to higher (lower) gains from the abolition of a BB requirement for a-types (b-types). The benefits from tax smoothing, m^s, and the costs of higher taxes, $-m^t$, increase for both types, whereas only a-types benefit from higher government spending, m^g. If ξ^a is sufficiently high the net welfare effect on b-types becomes negative and the latter prefer the situation in which the government must not issue debt.

Consider next the case where g_{e1} is varied and $\xi^a = 3$. For $g_{e1} = 0$, the level of exogenous government expenditure is constant over time and the government chooses $g_g = \bar{g}_g$, independently of the institutional framework. As soon as g_{e1} rises, so that $g_{e1} > g_{e0}$, the ability to issue debt reduces the cost of financing. Tax smoothing therefore becomes beneficial, $m^s > 0$. On the other hand, the abolition of a BB rule increases the optimal amount of g_g. The direct welfare effect on a-types as well as the tax effect on both types gain in importance. For values of g_{e1} that are not too high, there is a negative net effect for b-types. They thus favor a BB requirement—in contrast to the a-types and the government.

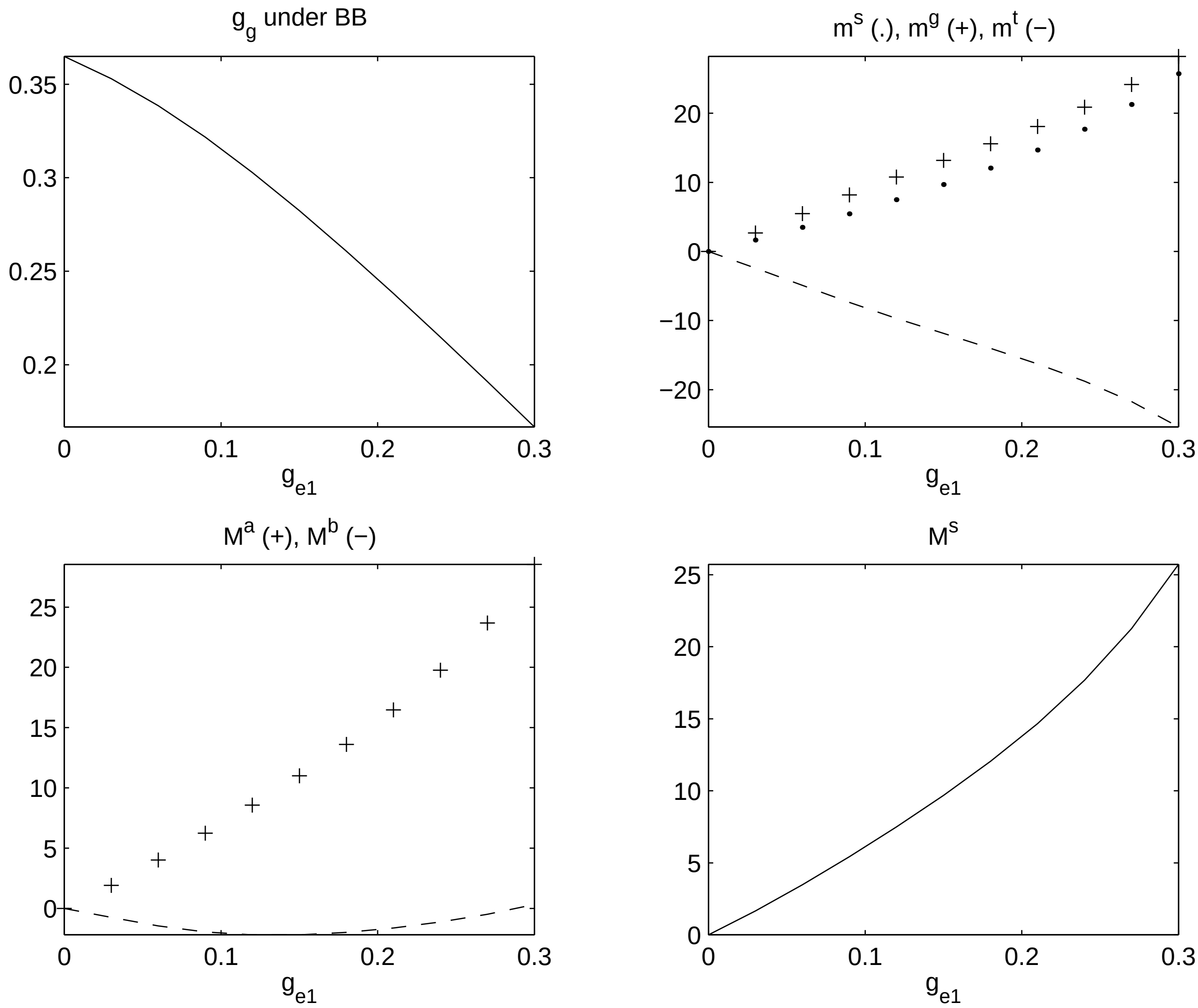

Figure 3: Effects of g_{e1}

4 Evidence, Discussion, and Conclusion

The model highlights two dimensions of intra-generational conflict that influence the attitude towards a BB requirement: Group-specific growth rates of the tax base, and group-specific preferences for government spending. Survey data on household attitudes towards a BB requirement supports the empirical relevance of these two dimensions. Blinder and Holtz-Eakin (1984) report findings from a Gallup Poll and a CBS/New York Times Poll, both from 1980, where individuals were asked whether they support a BB requirement. Whereas the income levels of the respondents had no influence on the reported attitude, variables associated with the income profile were of importance: Respondents who had recently been laid off were more likely to support a BB requirement while those who considered themselves better off than a year ago were less likely to do so. To the extent that unemployment spells are associated with a temporary, but persistent, loss in taxable income (cf. Hall, 1995), the tax shifting channel explains these findings. In the same study, Blinder and Holtz-Eakin (1984) report evidence in favor of the second link suggested by the model, i.e., between differences in the preference for government spending and the attitude towards a BB requirement: "Respondents divided almost evenly among three general arguments in favor: ... [T]hat balancing the budget is a good way to cut wasteful government programs" (p. 147). Arguments made in the political debate in many countries appear to conform with this view.[25]

What alternative explanations for the political support of BB rules are available? The literature suggests two possible roles for constitutional constraints on financial policy: To prevent intergenerational distribution, or improve on third-best policy outcomes. Whereas intergenerational distribution through government debt is clearly an important aspect of financial policy, it is unclear why this effect should give rise to political *support* for a BB requirement. If households care about the welfare of later generations, it is not necessary to protect them by means of a BB requirement. If households do not care about their descendents, however, it is unclear why the former or their political representatives would ever want to tie their own hands by supporting a BB rule.

The political economics literature on financial policy suggests the possibility of a Pareto improving BB rule. Support for a BB requirement might, for example, arise from the intention to overcome a common pool problem of the sort discussed by Persson and Tabellini (1999): In their model, a politico-economic equilibrium without restrictions on budget deficits results in an inefficiently high level of government debt, because legislators do not fully internalize the opportunity costs of budget deficits.[26] Persson and Tabellini discuss an example where the introduction of a BB requirement in such a deficit bias environment leads to a Pareto improvement.[27] In a slightly different form, the common pool problem also arises in Tabellini and Alesina's (1990) model where subsequent governments disagree about the projects that should receive government funding. Since a budget deficit by the first government reduces the amount of resources available to the second, and the former government does not (highly) value the project funded by the latter, private and social opportunity costs of deficits diverge. The resulting politico-economic equilibrium is third best ex ante. Once more, a BB requirement might lead to an (ex ante) Pareto improvement.[28]

Other arguments for Pareto improving restrictions on financial policy stress possible negative externalities of government debt. Irresponsible financial policies by myopic governments might, for example, lead to a situation where the market value of outstanding debt falls significantly below par. To the extent that such a crash comes as a surprise and markets are incomplete, the government's effective default may lead to serious financial fragility and spillovers into the real economy. Restrictions of any sort that render such a scenario less probable, for example a constitutional debt ceiling and a BB rule, might therefore entail significant welfare gains. On the other hand, the assumption of market incompleteness also introduces various arguments *in favor* of government debt and budget flexibility. For instance, debt may play an important role as a source of liquidity or collateral (Aiyagari and McGrattan, 1998; Holmström and Tirole, 1998). Whether the net social impact of debt through these different channels is positive or negative

[25] There is also a clearly identified empirical relationship between budgetary institutions and the realized level of government spending, specifically investment outlays (cf. Poterba, 1994; Peletier, Dur and Swank, 1999).

[26] This situation arises since each member of a coalition government perceives the government's budget constraint to be soft in the sense that higher contemporaneous expenditures for her individual pet project result in lower future government expenditure for *all* projects, not only the personal favorite. Cf. also Chari and Cole (1993).

[27] It is clear, however, that a BB rule can efficiently correct the underlying common pool problem only in rare circumstances. In general, it is an inefficient instrument.

[28] This is only the case under very specific circumstances. Peletier et al. (1999) show that the apparent benefits of a BB rule hinge on the assumption that the first government only determines the deficit, and not the level of public investment (which would constitute an additional state variable in the problem of the second government). The model of Alesina and Drazen (1991) features the common pool problem in yet another form.

remains unclear.

Finally, tight budgetary rules have been motivated by the need to counteract fiscal threats to price stability.[29] For example, Artis and Winkler (1997) rationalize the European Central Bank's support for budgets "close to balance" through the argument that the provisions of the "Stability and Growth Pact" are necessary "to support the strategic leadership of the European Central Bank (ECB) in the economic policy making of the Euro Area" (non technical summary). Without institutional restrictions, "negative effects of undisciplined fiscal policy on the incentives, credibility and performance of the common monetary policy" might result (p. 21). Were governments to implement a lax fiscal and financial policy, the ECB would have to gain credibility in financial markets by not accommodating the associated inflationary expectations and imposing "great real economic costs in an attempt to reassert its strategic leadership" (p. 32).

Institutional restrictions on financial policy makers hardly constitute an adequate remedy in such a scenario. Even if the central bank might, at some point, be forced to pursue a restrictive monetary policy in order to gain credibility, the associated social costs arise only once. In contrast, a BB requirement permanently deprives the government of valuable financial flexibility. Moreover, a BB rule does not lend credibility to the central bank. It solely reduces the political pressure on the central bank to ease monetary policy for fiscal reasons. For many other reasons, (e.g., high unemployment) the pressure for soft money remains high. A credible commitment to withstand those pressures must be established by the central bank itself, it cannot be arranged through fiscal restrictions. Indeed, a BB rule might actually reduce the central bank's credibility to the extent that higher volatility in the economy due to lower financial and fiscal stabilization increases the political pressure to ease monetary policy.[30]

This discussion shows that it is difficult to convincingly argue that a BB requirement leads to a Pareto improvement. Even in those cases where the argument can be made, it is far from clear why a BB requirement should be the most adequate measure for correcting the underlying source of the inefficiency. On the positive side, this casts doubt on theories motivating the observed support for BB rules by arguments based on efficiency considerations. Moreover, such efficiency based arguments cannot explain why a BB requirement should find only *partial* support. A second traditional line of explanation, based on inter-generational conflict about the distribution of tax burdens, appears similarly problematic. It cannot easily explain why members of the current generation should support a BB requirement. Intra-generational conflicts of the sort proposed in this paper do offer a convincing explanation, however. Fiscal policy, and the rules under which it is conducted, may be subject to even more distributive conflict than generally acknowledged.

[29]Loose interpretations of the "fiscal theory of the price level" have also been called upon to motivate strict fiscal rules. For a critique of the fiscal theory of the price level, see Niepelt (2004).

[30]This point is acknowledged by Artis and Winkler (1997, p. 33). More generally, restrictions on fiscal policy makers cannot lend credibility to the central bank but can, at most, convince financial markets that the central bank does not need credibility. The central bank's support for such institutional restrictions could be interpreted as a signal that the bank itself does not trust its own ability to commit to low inflation targets.

A Derivations and Proofs

A.1 Equilibrium Allocation

The household's first order conditions are given by

$$\begin{aligned}
\beta^t c_0^i / c_t^i f_0^t(\epsilon^t|\epsilon_0) &= p_t/p_0, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T, \\
w_t^i(1-\tau_t)/c_t^i &= \gamma^i / x_t^i, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T,
\end{aligned}$$

and the budget constraint. Substituting out prices and tax rates reduces these first-order conditions to the implementability constraints

$$\sum_{t=0}^{T} \beta^t \int 1 - \gamma^a[1 - x_t^a]/x_t^a \ dF_0^t(\epsilon^t|\epsilon_0) = 0, \tag{14}$$

$$\sum_{t=0}^{T} \beta^t \int 1 - \gamma^b[1 - x_t^b]/x_t^b \ dF_0^t(\epsilon^t|\epsilon_0) = 0, \tag{15}$$

$$\frac{c_t^a}{c_t^b} = \frac{c_0^a}{c_0^b} \equiv c, \ \forall \epsilon^t, t = 1, 2, \ldots, T, \tag{16}$$

$$\frac{x_t^a w_t^a}{x_t^b w_t^b \gamma} = c, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T. \tag{17}$$

Equations (14) and (15) combine the households' budget constraints with the static and dynamic optimality conditions. Condition (16) captures the restriction that all households face the same state prices. According to (17), the marginal rates of substitution between goods and leisure, adjusted for differences in productivity, are identical across households because both types of consumers are subject to the same marginal tax rates. (14)–(17) simplify to

$$\frac{\gamma^b}{1+\gamma^a} \frac{1}{\sum_{t=0}^{T} \beta^t} \sum_{t=0}^{T} \beta^t \int \frac{w_t}{x_t^b} dF_0^t(\epsilon^t|\epsilon_0) = c, \tag{18}$$

$$\frac{1+\gamma^b}{\gamma^b} \sum_{t=0}^{T} \beta^t = \sum_{t=0}^{T} \beta^t \int \frac{1}{x_t^b} dF_0^t(\epsilon^t|\epsilon_0), \tag{19}$$

$$c_t^a = c_t^b c, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T, \tag{20}$$

$$x_t^a = x_t^b c\gamma / w_t, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T. \tag{21}$$

Equations (18)–(21) represent all the equilibrium restrictions resulting from households' optimizing behavior.

Substituting for c_t^a and x_t^a (from (20) and (21)) in the resource constraint results in

$$c_t^b = \frac{e_t - x_t^b w_t^b(\eta c \gamma + 1 - \eta)}{\eta c + 1 - \eta}, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T. \tag{22}$$

When choosing the tax profile and g_g, the government must take its own budget constraint, the implementability constraints (18)–(21), and the resource constraints into account. Given the latter, one of the three budget constraints is redundant. Without further restrictions on financial policy, the government faces a single intertemporal budget constraint,

$$\sum_{t=0}^{T} \int p_t[g_t - \tau_t(\eta w_t^a(1 - x_t^a) + (1-\eta) w_t^b(1 - x_t^b))] d\epsilon^t = 0,$$

or, using the households' first-order conditions to substitute out prices and tax rates,

$$\sum_{t=0}^{T} \beta^t \int s_t \, dF_0^t(\epsilon^t|\epsilon_0) = 0, \tag{23}$$
$$s_t \equiv \eta c(1+\gamma^a) + (1-\eta)(1+\gamma^b) - \gamma^b(\eta w_t + 1 - \eta)/x_t^b.$$

Under institutional restrictions on government financing, (23) is replaced by tighter constraints.[31] Specifically, a BB rule requires tax revenues to equal government expenditure in each state of each period, i.e.,

$$s_t = 0, \ \forall \epsilon^t, t = 0, 1, 2, \ldots, T. \tag{24}$$

Under a BB rule, the allocation satisfies (18)–(21), (22), and (24) and involves one degree of freedom (since the choice of g_g determines all tax rates). Under no BB rule, it satisfies (18)–(21), (22), and (23) and involves multiple degrees of freedom (since the government can choose g_g and can shift tax collections across time and states of nature).

To derive the allocation under a BB policy for a given choice of g_g, (19) and (24) are solved for c; (24) for x_t^b, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$; (22) for c_t^b, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$; and finally (20) and (21) for c_t^a, x_t^a, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$.

To derive the allocation under no BB rule, (19) is solved for x_0^b (given the values of the policy instruments g_g and x_t^b, $\forall \epsilon^t, t = 1, 2, \ldots, T$); (18) for c; (22) for c_t^b, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$; and finally (20) and (21) for c_t^a, x_t^a, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$.

A.2 Proposition 3

Statement Suppose that $w_t = w$, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$. Define

$$\begin{aligned} K_1 &\equiv (1+\gamma^b)\frac{\eta\gamma(1+\gamma^b)w + (1-\eta)(1+\gamma^a)}{\eta(1+\gamma^b)w + (1-\eta)(1+\gamma^a)}, \\ K_2 &\equiv \frac{(1+\gamma^a)(1+\gamma^b)}{\eta(1+\gamma^b)w + (1-\eta)(1+\gamma^a)}. \end{aligned}$$

Suppose furthermore that $w_t^b > g_t K_2$, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$. (This implies that a BB policy is implementable.) Consider a marginal increase in x_t^b around the BB allocation. The welfare effect on both a- and b-types is given by

$$\beta^t f_0^t(\epsilon^t|\epsilon_0) K_1 K_2 \left[\frac{w_t^b g_0 - w_0^b g_t}{(w_0^b - g_0 K_2)(w_t^b - g_t K_2)}\right].$$

Social welfare weakly increases if

$$\frac{w_t^b}{w_0^b} \geq \frac{g_t}{g_0}.$$

[31] In that case, one of the households' budget constraints—but not the government's budget constraint—is redundant.

Proof The BB allocation is implementable if $g_t < \eta w_t^a(1-\bar{x}_t^a) + (1-\eta)w_t^b(1-\bar{x}_t^b)$, $\forall \epsilon^t, t = 0,1,2,\ldots,T$. (Equivalently, the tax rates are smaller than 1.) With a fixed w_t, this reduces to $g_t < \eta w_t^a/(1+\gamma^a) + (1-\eta)w_t^b/(1+\gamma^b)$, $\forall \epsilon^t, t = 0,1,2,\ldots,T$, or $w_t^b > g_t K_2$, $\forall \epsilon^t, t = 0,1,2,\ldots,T$.

With w_t fixed, c is invariant with the financial policy. Furthermore, $\bar{x}_t^b = \bar{x}_0^b$, $\partial \bar{x}_0^b/\partial \bar{x}_t^b = -\beta^t f_0^t(\epsilon^t|\epsilon_0)$ and the two direct welfare effects due to changes in leisure in periods 0 and t wash out, independently of γ^i, $i = a, b$.

The remaining welfare effect for any type takes the form

$$\beta^t f_0^t(\epsilon^t|\epsilon_0)\left[\left(-\frac{\gamma^b}{1-\bar{\tau}_t}\frac{1}{\bar{x}_t^b}\frac{\eta\bar{c}\gamma+1-\eta}{\eta\bar{c}+1-\eta}\right) - \left(-\frac{\gamma^b}{1-\bar{\tau}_0}\frac{1}{\bar{x}_0^b}\frac{\eta\bar{c}\gamma+1-\eta}{\eta\bar{c}+1-\eta}\right)\right].$$

Since $\bar{c} = w(1+\gamma^b)/(1+\gamma^a)$, this reduces to

$$\beta^t f_0^t(\epsilon^t|\epsilon_0)K_1\left[\left(1-\frac{1}{1-\bar{\tau}_t}\right) - \left(1-\frac{1}{1-\bar{\tau}_0}\right)\right].$$

Since the sign of the welfare effect only depends on the two tax rates, we have a "real" tax rate smoothing result.

Finally, $\bar{\tau}_t = g_t K_2/w_t^b$. The result then follows.

A.3 Proof of Proposition 4

Let $R_t \equiv e_t/(e_t - g_t\gamma^b)$. With $\gamma = 1$, it follows that $\bar{c}_t^b = \Omega(e_t - g_t\gamma^b)/(B(1+\gamma^b))$, $\bar{c} = (B-(1-\eta)\Omega)/(\eta\Omega)$ and

$$\left(\frac{\gamma^b}{\bar{x}_t^b} + \frac{1}{\bar{c}_t^b}\frac{\partial \bar{c}_t^b}{\partial x_t^b}\right) = -\frac{B}{\Omega}\frac{(1+\gamma^b)^2}{\eta w_t + 1 - \eta}Q_t.$$

Furthermore,

$$-\frac{1}{\bar{c}_t^b}\frac{\partial \bar{c}_t^b}{\partial c} = \frac{(1+\gamma^b)\eta}{(\eta\bar{c}+1-\eta)^2}\frac{B}{\Omega}R_t = (1+\gamma^b)\Omega\eta R_t/B$$

and

$$\frac{\partial \bar{c}}{\partial x_t^b} = -\beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{1+\gamma^b}{\gamma^b}\frac{B}{\Omega^2}\frac{w_t - w_0}{(\eta w_t + 1 - \eta)^2}.$$

Substituting these results into the general expressions for the welfare effects in D_{1t} and D_{2t}, it follows that

$$\begin{aligned}
U_\gamma &= V_\gamma - \beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{(1+\gamma^b)^2}{\gamma^b\Omega}\frac{\eta(w_t - w_0)}{(\eta w_t + 1 - \eta)^2}\frac{B^2}{B-(1-\eta)\Omega}, \\
V_\gamma &= \beta^t f_0^t(\epsilon^t|\epsilon_0)\left\{-\frac{(1+\gamma^b)^2}{\eta w_t + 1 - \eta}\frac{B}{\Omega}\left[Q_t - Q_0\frac{\eta w_0 + 1 - \eta}{\eta w_t + 1 - \eta}\right] + \right. \\
&\qquad \left. \frac{(1+\gamma^b)^2}{\gamma^b\Omega}\frac{\eta(w_t - w_0)}{(\eta w_t + 1 - \eta)^2}\left[\sum_{s=0}^{T}\beta^s\int R_s dF_0^s(\epsilon^s|\epsilon_0)\right]\right\}.
\end{aligned}$$

Note that $R_t/\gamma^b - Q_t = 1/\gamma^b$. Therefore

$$\sum_{s=0}^{T}\beta^s\int R_s dF_0^s(\epsilon^s|\epsilon_0)/\gamma^b - \tilde{Q}\sum_{s=0}^{T}\beta^s = 1/\gamma^b\sum_{s=0}^{T}\beta^s.$$

The given expressions follow. Furthermore,

$$\left(1 - \frac{B}{B-(1-\eta)\Omega}\right) = -\frac{(1-\eta)\Omega}{B-(1-\eta)\Omega} = -\frac{1-\eta}{\eta\bar{c}} < 0.$$

A.4 Proposition 5

Statement Suppose $\gamma = 1$. Suppose furthermore that $\theta^a = \theta^b$, $0 < \eta < 1$, and $Q_t = Q$, $\forall \epsilon^t, t = 0, 1, 2, \ldots, T$. A marginal increase in x_t^b around the BB allocation weakly increases social welfare if

$$(w_t - w_0)\left(1 - \frac{1}{\bar{c}}\right) \geq 0,$$

where $\bar{c} = (B - (1-\eta)\Omega)/(\eta\Omega)$. Welfare of a-types increases if $w_0 > w_t$, welfare of b-types increases if the reverse inequality holds. The effect on welfare of a- and b-types, respectively, is given by

$$\beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{B}{B-(1-\eta)\Omega}\frac{(1+\gamma^b)^2}{\gamma^b}\frac{\eta(w_t - w_0)}{(\eta w_t + 1 - \eta)^2}(\eta - 1),$$
$$\beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{B}{\Omega}\frac{(1+\gamma^b)^2}{\gamma^b}\frac{\eta(w_t - w_0)}{(\eta w_t + 1 - \eta)^2}.$$

Proof With constant Q_t, $Q_t = Q_0 = \tilde{Q}$. It follows from Proposition 4 that

$$\begin{aligned} U_\gamma &= \beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{(1+\gamma^b)^2}{(\eta w_t + 1 - \eta)^2}\frac{B}{\Omega}\eta(w_t - w_0)\frac{1}{\gamma^b}\left(1 - \frac{B}{B-(1-\eta)\Omega}\right), \\ V_\gamma &= \beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{(1+\gamma^b)^2}{(\eta w_t + 1 - \eta)^2}\frac{B}{\Omega}\eta(w_t - w_0)\frac{1}{\gamma^b}. \end{aligned}$$

Summing up across households, social welfare changes by

$$\beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{(1+\gamma^b)^2}{(\eta w_t + 1 - \eta)^2}\frac{B}{\Omega}\eta(w_t - w_0)\frac{1}{\gamma^b}\left[1 - \frac{B\eta}{B-(1-\eta)\Omega}\right]$$

or

$$\beta^t f_0^t(\epsilon^t|\epsilon_0)\frac{1+\gamma^b}{\eta w_t + 1 - \eta}\eta(w_t - w_0)\frac{1}{\bar{x}_t^b}(1-\eta)\left(1 - \frac{1}{\bar{c}}\right).$$

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ISSN 0347-8769
Stockholm, 2003
Institute for International Economic Studies